

2. On the Presence of Pterygoid Teeth in a Tailless Batrachian (*Pelobates cultripes*), with Remarks on the Localization of Teeth on the Palate in Batrachians and Reptiles. By G. A. BOULENGER.

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On recently examining some disarticulated bones of Batrachians, which I prepared in 1877, and which I had not looked at since, I was very much surprised to find a few small teeth on the left pterygoid bone (the right one had been lost) and on the parasphenoid in a skull of *Pelobates cultripes*. My attention once drawn to this point, which is of considerable importance from the fact that pterygoid teeth have not yet been recorded in any living Batrachian, I examined the various skulls of *Pelobates* in the British Museum, and also removed the mucous membrane from the palate of several specimens in spirit, with the result that, although I have failed to detect any teeth on the pterygoids or parasphenoid of *Pelobates fuscus*, I have succeeded in finding pterygoid teeth in two other specimens of *P. cultripes*, one from Nantes, the other from the south of France. I will designate the former specimen as *a*, the latter as *b*, and the imperfect skull (from Bordeaux), mentioned above, as *c*.

In all three these teeth are small, grain-like, resembling the same in various Stegocephala; the mucous membrane of the palate has to be removed to ascertain their presence; they are evidently in a rudimentary condition.

In specimen *a* there are about ten teeth on the parasphenoid, at the base of the longitudinal branch of the  $\perp$ -shaped bone, and two pterygoid teeth close together on the left side. Specimen *b* has no teeth on the parasphenoid nor on the left pterygoid, but shows a group of eight distinct teeth on the right pterygoid. In specimen *c*, as in *a*, there are about ten teeth on the parasphenoid, and a series of four on the left pterygoid (the right being lost).

Our knowledge of the localization of the teeth on the various bones of the palate in Batrachians and Reptiles has so much increased of late<sup>1</sup> that it appears to me useful, on this occasion, to review and tabulate the data available at present in recent and fossil forms.

Whilst in not a few fishes all the bones of the palate are toothed, it is only among the lowly Stegocephala that we meet, higher up in the scale, with such a disposition. As evolution proceeds in both the Batrachian and Reptilian phylæ, we find the palatal dentition more and more localized and reduced. Thus, in the Urodeles or tailed Batrachians, we have frequent examples of a toothed parasphenoid, no form, however, showing teeth on the pterygoids, but all agreeing in having them on the vomers and palatines<sup>2</sup>. In the

<sup>1</sup> A table, very incomplete even at the time it was published, of the dentition of recent Batrachians is given by O. Hertwig in his admirable memoir "Ueber das Zahnsystem der Amphibien," Arch. mikr. Anat. xi. Suppl. (1874).

<sup>2</sup> In the *Proteida* the palatines are not yet separated from the pterygoids in most Urodeles they are fused with the vomers.

tailless Batrachians most forms are provided with teeth on the vomers, whilst but a few have any upon either the palatines or the parasphenoid. Among Reptiles, a distribution of the teeth on as many as three elements (pterygoids, palatines, vomers) is only known in two forms—a Rhynchocephalian and Lacertilian. It is a fact that the Batrachians generally agree with the Fishes in the sequence in which the teeth of the palate are usually lost, viz., in the following order:—(1) Pterygoid, (2) Parasphenoid, (3) Palatine, (4) Vomer; whilst in the Reptilia we find great

Teeth on	STEGOCEPHALA.	BATRACHIA.	REPTILIA.
Vomers, Palatines, Pterygoids, Parasphenoid.	<i>Dawsonia.</i> <i>Seeleya.</i> <i>Acanthostoma.</i>	..... ..	.....
Vomers, Palatines, Pterygoids.	.....	.....	<i>Champsosaurus.</i> <i>Ophisaurus.*</i>
Vomers, Palatines, Parasphenoid.	.....	Caudata ( <i>Pletho-</i> <i>dontine,</i> <i>Desmognathinæ</i> ).	.....
Vomers, Pterygoids, Parasphenoid.	.....	<i>Pelobates.*</i>	.....
Vomers, Palatines.	<i>Sparodus.</i> <i>Hylerpeton.</i> <i>Mastodonsaurus.</i> <i>Capitosaurus.</i> <i>Labyrinthodon.</i>	Caudata gener- ally. Apoda. <i>Ceratohyla.</i> <i>Hemiphractus.</i>	<i>Sphenodon.*</i> <i>Hyperodapedon.</i> <i>Palæohatteria.</i> <i>Proterosaurus.</i>
Vomers, Pterygoids.	.....	.....	<i>Procolophon.</i>
Vomers, Parasphe- noid.	.....	<i>Tripriion.</i>	.....
Palatines, Pterygoids.	.....	.....	Placodontia. <i>Chamæcolis.</i> <i>Heloderma.*</i> Ophidia gener- ally.
Palatines, Parasphe- noid.	.....	<i>Amphodus.</i>	.....
Vomers.....	<i>Branchiosaurus.</i> <i>Nyravia.</i>	Ecaudata gener- ally.	.....
Palatines .....	.....	<i>Callula.*</i> <i>Genyophryne.</i> <i>Dyscophidæ.</i>	<i>Oligodon.*</i> <i>Dasypeltis.</i> <i>Atractaspis.</i>
Pterygoids .....	.....	.....	Lacertilia gener- ally. Mosasauria.

diversity. The Rhynchocephalians appear to lose the pterygoid teeth first, the vomerine next. In the Squamata, the predominating Reptilian type at the present period, vomerine teeth are known in but a single genus (*Ophisaurus*) of the family *Anguidæ*, which has in addition palatine and pterygoid teeth; and in these Squamata we see that the rule in the suborder Lacertilia is to lose the teeth from front to back, and in the suborder Ophidia from back to front. Thus, there are but two genera of Lizards with palatine teeth, and they are also armed with teeth on the pterygoids; and the few genera of Snakes in which the teeth are restricted to one of the two bones have them invariably on the palatines.

I have attempted to record in the table (see p. 665) what is at present known of the distribution of the teeth on the palates of the Reptiles and Batrachians. An asterisk after a generic name indicates that the character is not constant throughout the genus.

### 3. On the Fijian Species of the Genus *Merula*.

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The four largest islands of the Fiji group each contain a species of *Merula*, which appears to be distinct from those found on the other three. Of these four species three are well known, but the fourth appears to be undescribed. The distribution of the four species is as follows:—

*Merula vanuensis*. Vanua-Levu.

*Merula layardi*. Viti-Levu.

*Merula ruficeps*. Kandavu.

*Merula tempesti*. Taviuni.

These four species differ from each other in many characters, of which the following are the most useful for diagnostic purposes:—

(a) In some species the under tail-coverts are uniform in colour, in others each under tail-covert has a conspicuous pale shaft-streak, widest at the tip. (b) The upper parts below the nape are nearly black in some species, and olive or brown in others. (c) The throat in one species is orange-buff, and in the others grey. These three characters serve to diagnose the four species as follows:—

	<i>vanuensis</i> .	}	
	{ <i>layardi</i> .	}	Throat grey.
Under tail-coverts uniform.	{ <i>tempesti</i> .	}	
	{ <i>ruficeps</i> .	}	Back nearly black.

The male differs somewhat from the female in all the species, but the characters given above are common to both sexes.